Here α and δ are the right ascension and declination of the point of disappearance as seen from the different stations, and α^1 and δ^1 are the right ascensions and declinations computed from the data given above.

From these right ascensions and declinations the longitude of the node, and the inclination of each of the great circles to the equator may be found as follows:

Station.	Longitude of node. N.		Inclination. I.	
Number.	°	′	°	′
1	201	6	139	25
6	185	21	157	37
20	210	33	158	37
23	158	24	165	15
26	164	5	167	27
30	129	37	140	38
31	150	12	152	25
34	109	38	141	2
40	40	27	53	20
41	37	37	62	8
43	274	10	28	0
48	298	16	52	52

The condition that the radiant shall lie on these great circles is exprest by the equation—

$$\sin N \sin I \cos D \cos A - \cos N \sin I \cos D \sin A + \cos I \sin D = 0,$$

where A and D are the equatorial coordinates of the radiant.

Forming these equations and solving them by the least-square method, there results

$$A = \quad 66° \; 55'$$
$$D = +29° \; 51'$$

When these values are substituted in the original equations, the residuals for several of the stations are found to be rather large. As it seemed possible that these might produce a sensible error in the results, the unknown quantities were again determined from equations not open to this objection, with the result

$$A = \quad 63° \; 40'$$
$$D = +31° \; 17'$$

When it is remembered that the observations are in general only estimates, the close agreement in these two results gives confidence in their substantial accuracy.

THE COURSE OF THE METEOR THRU THE ATMOSPHERE.

By the well-known formulas of spherical astronomy, this right ascension and declination of the radiant may be changed into azimuth and altitude. The result shows that, as viewed from the point of disappearance, the bearing and angular height above the horizon of the point from which the meteor appeared to come are

Azimuth S. 86° 55′ E.
Altitude 56° 27′.

It will be noticed that this course differs by nearly 30° from that laid down in the bulletin to which reference has been made. The observers at Washington saw the meteor to the south, and this is also the report from Milford, Del.; while to the observers at Woodstock and Buckhannon it seemed nearly to follow a vertical circle. As usual there is much confusion in the notices, but those that apparently deserve the most confidence seem to bear out the course indicated.

The most difficult results to obtain from the observations have been the data needed in order to compute the velocity thru the atmosphere. If the azimuths recorded by Mr. Inman, of Washington, D. C., and by Mr. Christian, at Appomattox Court-house, are plotted on the map in the bulletin, they will be found to intersect very near the mouth of the Choptank River, on the eastern shore of Chesapeake Bay. This point of intersection lies on the track of the meteor as traced above, and it is here that I am inclined to place its first appearance. As to the height of this point above the ground we have the following data:

	Miles.
Danbury, Conn.	138
Mercersburg, Pa.	112
Newark, Del.	127
Newcastle, Del.	150
Appomattox Court-house, Va.	134
Woodstock, Va.	120
Average	130

While this great elevation is by no means unprecedented, yet it is by no means common. Corresponding to it, the length of the flight may be taken as 154 miles. As usual, the evidence as to the duration of the flight is very weak. The authors of the report estimated it at not less than three nor more than five seconds. If we take the mean of these estimates, the velocity was 38.5 miles per second.

THE ORBIT WITH REGARD TO THE SUN.

The computation of the orbit in space proceeds according to well-established principles of theoretical astronomy. From the data contained in the Nautical Almanac, it is found that the longitude of the apex of the earth's motion was 183° 15′. When the radiant point, as given above, is freed from the effect of the attraction of the earth and from the effect of its motion in space, the position of the true radiant point or position in space from which the meteor actually came is found to be

λ (celestial longitude) 50° 47′
β (celestial latitude) + 6° 26′

and its velocity about fifty miles per second. It was following and overtook the earth, the angle between its path and the direction to the apex being 132°. The elements of the orbit with regard to the sun are

Ω	(longitude of ascending node)	273° 22′
i	(inclination to ecliptic)	9° 28′
π	(longitude of perihelion)	150° 12′
log q	(logarithm of perihelion distance)	9.7937
log e	(logarithm of eccentricity)	0.6329

A PERSISTENT METEOR TRAIN OBSERVED AT ALBANY, N. Y.

By Prof. HENRY A. PECK. Dated Syracuse University, Syracuse, N. Y., October 22, 1907.

During the early twilight of Sunday evening, February 10, 1907, a large meteor was seen in the general direction of the setting sun by residents of Albany, N. Y., and the surrounding territory. Snow squalls had been frequent during the afternoon, and, on this account, in spite of the exertions of Mr. G. T. Todd, the local forecaster of the Weather Bureau, only very meager accounts of the phenomenon were obtained. This is much to be regretted, as the meteor was attended by a train that persisted for fully a quarter of an hour, apparently drifting to the north. Mr. Robert E. Horton, of Albany, resident engineer of the barge canal, was one of the observers, and has kindly furnished the following description:

Sunday evening, February 10, at 5:45 p. m., standard time, I chanced to look from a window facing the south. I was surprised to find the sky overcast with light, yellowish, fleecy clouds of a type which I have seen preceding a midsummer hailstorm. The edge of the cloud canopy was about ten degrees above the horizon when first seen, and underneath was a heavy bank of black clouds reaching about the same altitude. * * * The cloud canopy was lifting and drifting rapidly toward the north. When it had reached an altitude of forty-five degrees, I was surprised to see, about S. 20° W, a zigzag streak of bright gold, the lower end of which was lost in the reddish haze above and back of the cloud bank and at an altitude of about twenty-five degrees. The upper end was visible to the naked eye at an altitude of twenty-five to thirty degrees against a background of clear blue sky. I called my wife to watch while I procured a Lemaire night glass. On my return at 5:50 p. m., it had not changed form but had changed color to a fleecy white. The sun had set and the cloud canopy had lifted nearly to the zenith. The field glass showed it to be apparently a rather dense, clearly demarked band of cloud, which when first seen was illumined by the sun.

A sketch which I made on a scrap of paper, showing its appearance thru the glass, is inclosed. (See Fig. 1.) The glass revealed several

broken bands invisible to the naked eye, as shown at B, C. The band was particularly brilliant in the vicinity of A, and this portion remained visible until dark. It changed form but little, the change, if any, being in the way of foreshortening, indicating that it was drifting toward the north.

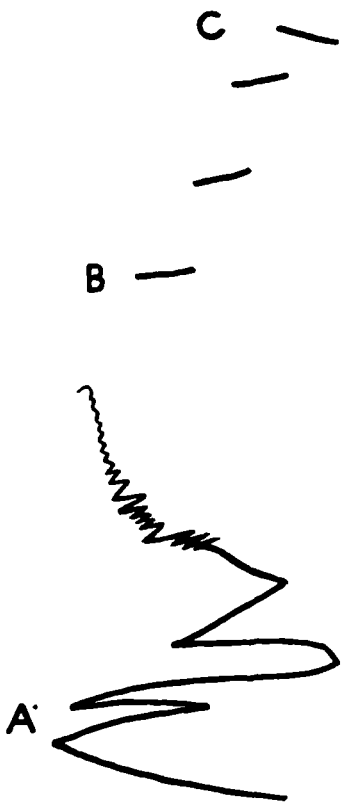

FIG. 1.—Meteor train of February 10, 1907, as sketched by Mr. Robert E. Horton.

Mr. M. W. Williams, of the Division Engineer's office in Albany, saw the phenomenon while in the city hall park.

It was 5:30 or 5:35 p. m. when I noticed the streak in the western sky, it being pretty nearly in the direction of the sun before the latter had set and against clear sky. At that time it appeared to be about as thick as the path of a flash of lightning, but in other points did not resemble one, being about this shape. (See Fig. 2.)

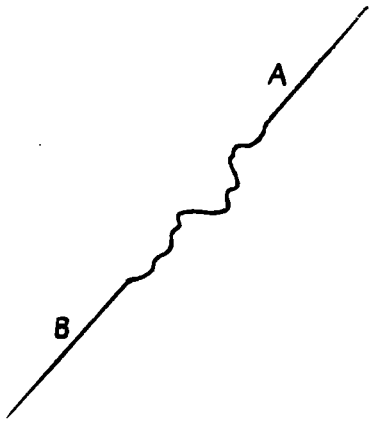

FIG. 2.—Meteor train of February 10, 1907, as sketched by Mr. M. W. Williams.

A and B appeared to be prolongations of each other and perfectly straight. The intervening crooked line had exactly the appearance of a cord which, after being stretched taut, is suddenly released at both ends. The streak began fading at once, and was invisible in about fifteen minutes, the middle of the crooked part being last visible.

Reports of a similar nature, but not so extensive, were received from the following persons:

William L. Stevens, Cobleskill; Mrs. J. W. Eaton, Albany; Mrs. Medora E. Davis, West Albany; Roy E. Crounse, Altamont; Harry Gaige, Altamont; Mrs. M. Orlup, Delanson; John Eddy, Glenmont.

Taking the horizontal refraction from the Poulkova tables, and the position of the sun together with the equation of time from the Nautical Almanac, the upper limit of the sun was tangent to the horizon at five hours and nineteen minutes standard time. It is, therefore, quite apparent from the known height at which meteor trains are apt to form that this one, from beginning to final disappearance, was still in full sunlight.

When the attempt is made to fix the path of the meteor and the limits of the train, the evidence is found to be quite meager. It evidently did not begin to attract attention, possibly on account of the bright twilight, until the appearance of the train. It is doubtful if any one saw the lower limit of the train on account of the condition of the sky. A canvass was made of all persons known to have seen the phenomenon, but while evidence was obtained confirming the accounts given above, the data for mathematical computation was very conflicting. The train was probably in the zenith in the vicinity of

Longitude 75° 30′ west of Greenwich,
Latitude 42° north,

at a distance of about a hundred miles from Albany, but no reports were ever received from that region.

RECENT ADDITIONS TO THE WEATHER BUREAU LIBRARY.

H. H. KIMBALL, Librarian.

The following titles have been selected from among the books recently received, as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies. Most of them can be loaned for a limited time to officials and employees who make application for them.

Baden. Zentralbureau für Meteorologie und Hydrographie.
Jahres-Bericht... 1906. Karlsruhe. 1907. 116 p. f°.

France. Association française pour l'avancement des sciences.
Compte rendu de la 35 session. Lyon 1906. Notes et mémoires. Paris. 1907. 1442 p. 8°.

Gironde. Commission météorologique.
Observations pluviométriques et thermométriques faites dans le Département de la Gironde de juin 1906 à mai 1907. Bordeaux. 1907. 49 p. 8°.

Hann, Julius.
Der tägliche Gang der Temperatur in der äusseren Tropenzone. B. Das indische und australische Tropengebiet. (S.-A. Denkschr. Akad. Wien. LXXXI. Bd.) Wien. 1907. 93 p. f°.

Herault. Commission météorologique.
Bulletin... Année 1906. Montpellier. 1907. 128 p. 4°.

Hesse. Grossherzogliches hydrographisches Bureau.
Deutsches meteorologisches Jahrbuch. Darmstadt. 1907. [13], 59 p. f°.

Kurz, Karl.
Die beeinflussung der Ergebnisse luftelektrischer Messungen durch die festen radioaktiven Stoffe der Atmosphäre. Dissertation... Giessen. 1907. 71 p. 8°.

Lange, Marcus.
Die Verteilung der Elektrizität auf zwei leitenden Kugeln in einem zu ihrer Zentrallinie symmetrischen elektrostatischen Felde. Dissertation... Giessen. Berlin. 1906. 14 p. f°.

Moedebeck, Hermann W. L.
Pocketbook of aeronautics. Translated by W. Mansergh Varley. London. 1907. xii, 496 p. 16.

Netherlands. Koninklijk nederlandsch meteorologisch instituut.
Onweders, optische verschijnselen, enz. in Nederland... 1905. Deel XXVI. Amsterdam. 1907. 125 p. 8°.

Pyrénées-Orientales. Commission météorologique.
34. bulletin météorologique... année 1905. Perpignan. [1907.] 51 p. 4°.

Rijckevorsel, [Elie] van.
Konstant auftretende secundäre Maxima und Minima in dem jährlichen Verlauf der meteorologischen Erscheinungen. Dritte und vierte Abteilung. Rotterdam. 1907. 24 p. f°.

Smithsonian institution.
Smithsonian meteorological tables. 3d rev. ed. Washington. 1907. lx, 280 p. 8°.